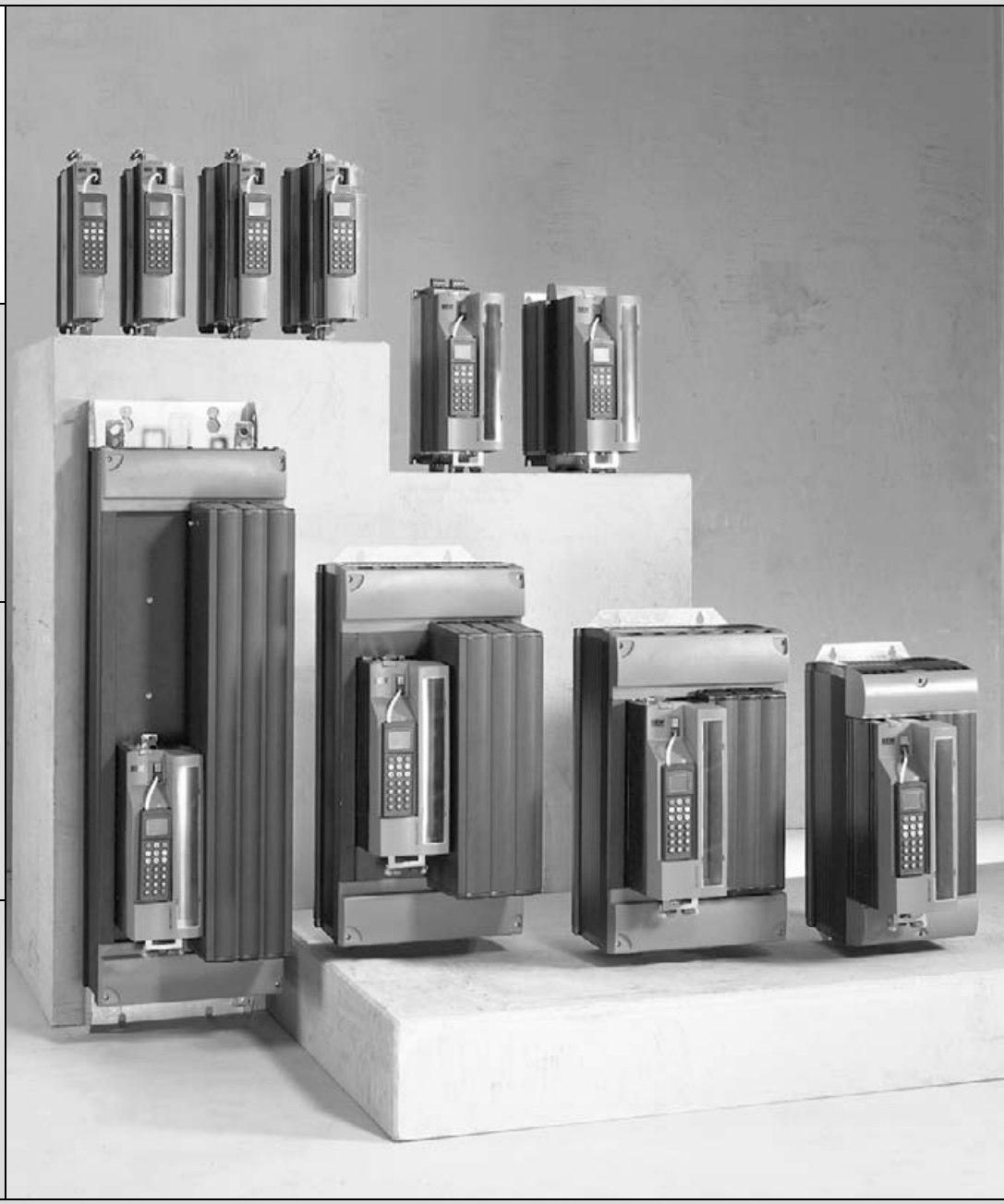
SEW EURODRIVE



MOVIDRIVE® MDX61B
Fieldbus Interface DFE11B Ethernet

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Manual

SEW
EURODRIVE

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1 Important Notes

- **This manual does not replace the detailed operating instructions!**
- **Only electrical specialists are allowed to perform installation and startup observing relevant accident prevention regulations and the MOVIDRIVE® MDX60B/61B operating instructions!**

Documentation

- Read through this manual carefully before you start installation and startup of MOVIDRIVE® drive inverters with the Ethernet DFE11B option card.
- This manual assumes that the user has access to and is familiar with the MOVIDRIVE® documentation, in particular the MOVIDRIVE® MDX60B/61B system manual.
- In this manual, cross references are marked with "→". For example, (→ Sec. X.X) means: Further information can be found in section X.X of this manual.
- A requirement of fault-free operation and fulfillment of any rights to claim under guarantee is that you observe the information in the documentation.

Bus systems

General safety notes on bus systems:

This communication system allows you to match the MOVIDRIVE® drive inverter to the specifics of your application. As with all bus systems, there is a danger of invisible, external (as far as the inverter is concerned) modifications to the parameters which give rise to changes in the inverter behavior. This may result in unexpected (not uncontrolled) system behavior.

Safety and warning notes

Always observe the safety and warning instructions contained in this publication!

Electrical hazard
Possible consequences: Severe or fatal injuries.

Hazard
Possible consequences: Severe or fatal injuries.

Hazardous situation
Possible consequences: Slight or minor injuries.

Harmful situation
Possible consequences: Damage to the unit and the environment.

Tips and useful information.

2 Introduction

Contents of this manual

This user manual describes how to install the DFE11B option card in the MOVIDRIVE® MDX61B drive inverter and how to start up MOVIDRIVE® with the Ethernet fieldbus system (MODBUS/TCP).

Additional documentation

For information on how to connect MOVIDRIVE® straightforwardly and effectively to the Ethernet fieldbus system, in addition to this user manual on the DFE11B option, you should request the following publication on fieldbus technology:

- "MOVIDRIVE® Fieldbus Unit Profile" manual

The "MOVIDRIVE® Fieldbus Unit Profile" manual describes the fieldbus parameters and their coding, and explains the whole range of control concepts and application options in the form of brief examples.

The "MOVIDRIVE® Fieldbus Unit Profile" manual contains a list of all parameters of the drive inverter that can be read or written via the various communication interfaces, such as Systembus, RS-485 and also via the fieldbus interface.

Features

The MOVIDRIVE® MDX61B drive inverter enables you to use the DFE11B option to connect to higher-level automation, project planning and visualization systems via Ethernet thanks to its powerful, universal fieldbus interface.

MOVIDRIVE® and Ethernet

The unit behavior of the inverter that forms the basis of Ethernet operation is referred to as the unit profile. It is independent of any particular fieldbus and is therefore a uniform feature. This allows the user to develop fieldbus-independent drive applications. This makes it much easier to change to other bus systems, such as Profibus (option DFP).

Access to all information

MOVIDRIVE® MDX61B offers digital access to all drive parameters and functions via the Ethernet interface. The drive inverter is controlled via high-speed, cyclical process data. Via this process data channel, you have the opportunity to enter setpoints such as the setpoint speed, ramp generator time for acceleration/deceleration, and so on, as well as triggering various drive functions such as enable, controller inhibit, normal stop, rapid stop, etc. However, at the same time you can also use this process data channel to read back actual values from the drive inverter, such as the actual speed, current, unit status, fault numbers or reference signals.

Configuring the Ethernet option card

By setting the IP address manually or allocating the IP address parameters over the DHCP server, the drive inverter can quickly be integrated in the Ethernet environment and activated. The remaining parameter setting process can then be performed in a fully automated process by the higher-level master (parameter download). This forward-looking variant shortens the system startup time and simplifies the documentation of your application program because all the important drive parameters can now be stored directly in your control program.

Monitoring functions

Using a fieldbus system demands additional monitoring functions for the drive technology, for example, time monitoring of the fieldbus (fieldbus timeout) or rapid stop concepts. You can, for example, adapt the monitoring functions of MOVIDRIVE® specifically to your application. You can determine, for instance, which of the drive inverter's fault responses should be triggered in the event of a bus error. It is a good idea to use a rapid stop function for many applications. However you can also freeze the last setpoints so that the drive continues to operate with the most recently valid setpoints (for example, conveyor belt). As the range of functions for the control terminals is also guaranteed in fieldbus mode, you can continue to implement rapid stop concepts using the terminals of the drive inverter, irrespective of the fieldbus used.

Diagnostics

The MOVIDRIVE® drive inverter offers numerous diagnostic options for startup and service. For example, you can use the integrated fieldbus monitor to check both the setpoints sent by the master control and the actual values. The integrated Web server means that you can access the diagnostic values using a standard browser.

Fieldbus monitor

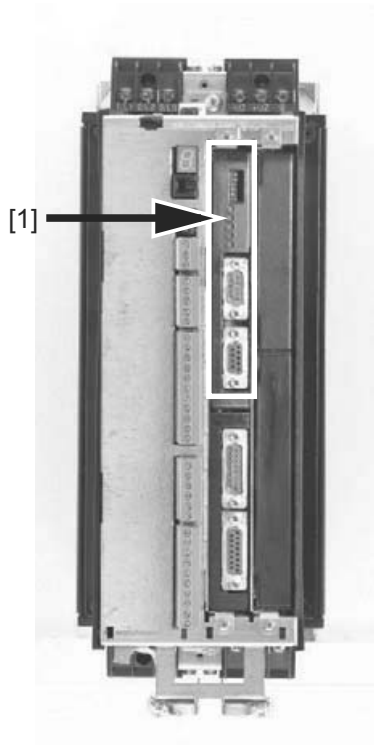
Furthermore, you are supplied with a variety of additional information about the status of the fieldbus option card. The fieldbus monitor function in conjunction with the MOVITOOLS® PC software offers you an easy-to-use diagnostic tool allowing all drive parameters to be set (including the fieldbus parameters) as well as displaying the fieldbus and device status information in detail.

3 Assembly / Installation Instructions

3.1 Installing the DFE11B option card

- MOVIDRIVE® MDX61B **must** have firmware status 824 854 0.11 or above. You can display the firmware status using parameter P076.
- **Only SEW-EURODRIVE engineers can install or remove option cards for MOVIDRIVE® MDX61B size 0**.
- **Option cards can only be installed and removed for MOVIDRIVE® MDX61B sizes 1 to 6.**

The DFE11B option card must be plugged into the fieldbus slot [1].



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Before you begin **Observe the following notes before installing or removing an option card:**

- Disconnect the inverter from power. Switch off the 24 V_{DC} and the supply voltage.
- Take appropriate measures to protect the option card from electrostatic charge (use discharge strap, conductive shoes, etc.) before touching it.
- **Before installing** the option card, remove the keypad and the front cover.
- **After installing** the option card, replace the front cover and the keypad.
- Keep the option card in its original packaging until immediately before you are ready to install it.
- Hold the option card by its edges only. Do not touch any components.

Basic procedure for installation/removing an option card

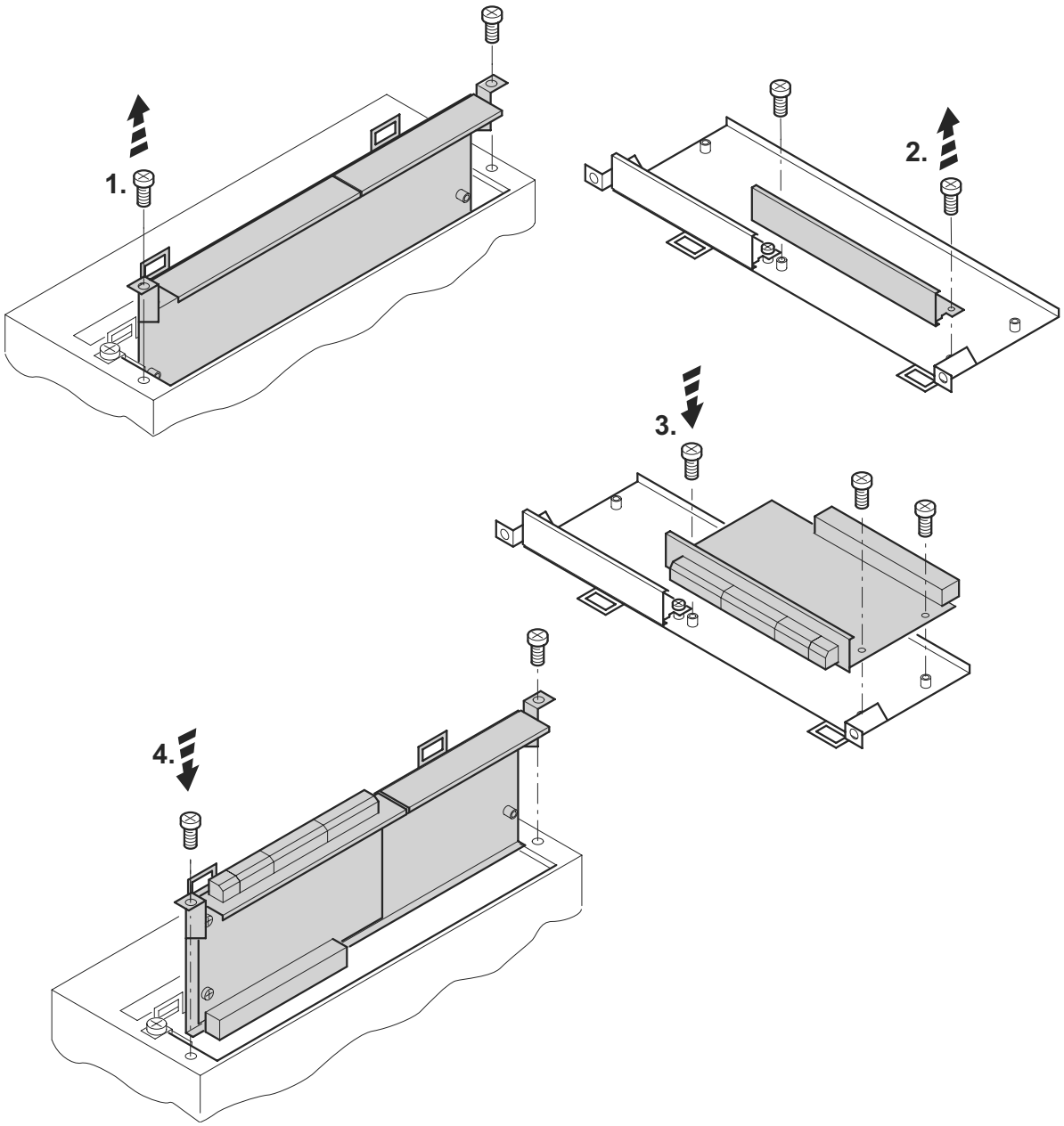

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Figure 1: Installing an option card in MOVIDRIVE® MDX61B sizes 1 to 6 (schematic diagram)

1. Remove the retaining screws holding the card retaining bracket. Pull the card retaining bracket out evenly from the slot (do not twist!).
2. Remove the retaining screws of the black cover plate on the card retaining bracket. Remove the black cover plate.
3. Position the option card onto the retaining bracket so that the retaining screws fit into the corresponding bores on the card retaining bracket.
4. Insert the retaining bracket with installed option card into the slot, pressing slightly so it is seated properly. Secure the card retaining bracket with the retaining screws.
5. To remove the option card, follow the instructions in reverse order.

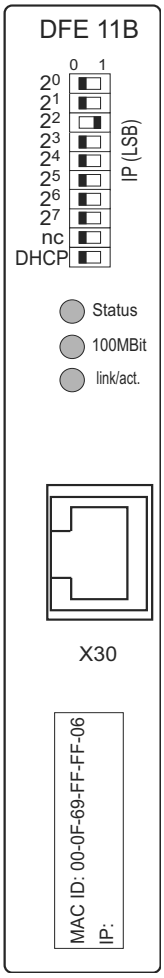
3.2 Connection and terminal description of the DFE11B option

Part number Ethernet interface type DFE11B option: 1 820 036 2

The "Ethernet interface type DFE11B" option is only possible in conjunction with MOVIDRIVE® MDX61B, not with MDX60B.

The DFE11B option must be plugged into the fieldbus slot.

The DFE11B option is powered by MOVIDRIVE®. A separate voltage supply is not required.

Front view of DFE11B	Description	DIP switch Terminal	Function
 54002AXX	**DIP switch for setting the least significant bytes (LSB) of the IP address**	**2^0** **2^1** **2^2** **2^3** **2^4** **2^5** **2^6** **2^7** **nc** **DHCP**	Significance: 1 Significance: 2 Significance: 4 Significance: 8 Significance: 16 Significance: 32 Significance: 64 Significance: 128 Reserved Activate DHCP
	LED status (red/yellow/green)		Shows the current status of the DFE11B.
	LED 100MBit (green)		Shows the baud rate of the Ethernet connection.
	LED link/act. (green)		Shows the status of the Ethernet connection.
	X30: Ethernet connection		
	MAC address		MAC address, e.g. to configure the DHCP server.
	IP input field:		Enter the current IP address in this field.

3.3 Pin assignment

Use prefabricated, shielded RJ45 plug connectors to IEC11801 edition 2.0, catageory 5.

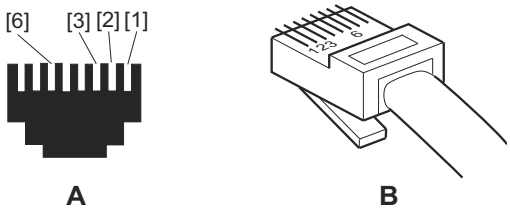


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Figure 2: Pin assignment of an RJ45 plug connector

A = Front view

B = Rear view

[1] Pin 1 TX+ Transmit Plus

[2] Pin 2 TX– Transmit Minus

[3] Pin 3 RX+ Receive Plus

[6] Pin 6 RX– Receive Minus

MOVIDRIVE® / Ethernet connection

To connect DFE11B to Ethernet, connect the Ethernet interface X30 (RJ45 plug) to the hub or switch provided using a twisted-pair cable to category 5, class D in accordance with IEC11801 edition 2. To do this, use a patch cable.

If you want to connect the DFE11B option card directly to your project planning computer, you require a cross over cable.

3.4 Shielding and routing bus cables

Only use shielded cables and connection elements that meet the requirements of category 5, class 2 to IEC11801 edition 2.0.

Correct shielding of the bus cable attenuates electrical interference that may occur in industrial environments. The following measures ensure the best possible shielding:

- Tighten the mounting screws on the connectors, modules and equipotential bonding conductors by hand.
- Only use connectors with a metal housing or a metallized housing.
- Connect the shielding in the connector with the greatest possible surface area.
- Attach the shielding of the bus line on both sides.
- Do not route signal and bus cables parallel to power cables (motor leads). They must be routed in separate cable ducts.
- Use metallic, grounded cable racks in industrial environments.
- Route the signal cable and the corresponding equipotential bonding in close proximity using the shortest way possible.
- Avoid using plug connectors to extend bus cables.
- Route the bus cables closely along existing grounding surfaces.

In case of fluctuations in the earth potential, a compensating current may flow via the bilaterally connected shield that is also connected to the protective earth (PE). Make sure you supply adequate equipotential bonding according to relevant VDE regulations in such a case.

3.5 TCP / IP addressing and subnetworks

Introduction

The settings for the address of the IP protocol are made using the following parameters:

- IP address
- Subnetwork screen
- Standard gateway

The addressing mechanisms and subdivision of the IP networks into subnetworks are explained in this chapter to help you set the parameters correctly.

IP address

The IP address is a 32 bit value that uniquely identifies a station in the network. An IP address is represented by four decimal numbers separated by points.

Example: 192.168.10.4

Each decimal number stands for one byte (= 8 bits) of the address and can also be represented using binary code (→ following table).

Byte 1		Byte 2		Byte 3		Byte 4
11000000	.	10101000	.	00001010	.	00000100

The IP address comprises a network address and a station address (→ following table).

Network address	Station address
192.168.10	4

The part of the IP address that deontes the network and the part that identifies the station is determined by the network class and the subnetwork mask.

Station addresses cannot consist of only zeros or ones (binary) because they represent the network itself or a broadcast address.

Network classes

The first byte of the IP address determines the network class and as such represents the division into network addresses and station addresses.

Value range Byte 1	Network class	Complete network address (Example)	Meaning
0 ... 127	A	10.1.22.3	10 = Network address 1.22.3 = Station address
128 ... 191	B	172.16.52.4	172.16 = Network address 52.4 = Station address
192 ... 223	C	192.168.10.4	192.168.10 = Network address 4 = Station address

This rough division is not sufficient for a number of networks. They also use an explicit, adjustable subnetwork mask.

Subnetwork mask

A subnetwork mask is used to divide the network classes into even finer sections. The subnetwork mask is represented by four decimal numbers separated by points, in the same way as the IP address. Every decimal number stands for one byte.

Example: 255.255.255.128

Each decimal number stands for one byte (= 8 bits) of the subnetwork mask and can also be represented using binary code (→ following table).

Byte 1		Byte 2		Byte 3		Byte 4
11111111	.	11111111	.	11111111	.	10000000

If you compare the IP addresses with the subnetwork masks, you see that in the binary representation of the subnetwork mask all ones determine the network address and all

the zeros determine the station address (→ following table).

		Byte 1		Byte 2		Byte 3		Byte 4
IP address	decimal	192	.	168.	.	10	.	128
	binary	11000000	.	10101000	.	1010	.	10000000
Subnetwork mask	decimal	255	.	255	.	255	.	128
	binary	11111111	.	11111111	.	11111111	.	10000000

The class C network with the address 192.168.10. is further subdivided into 255.255.255.128 using the subnetwork mask. Two networks are created with the address 192.168.10.0 and 192.168.10.128.

The following station addresses are permitted in the two networks:

- 192.168.10.1 ... 192.168.10.127
- 192.168.10.129 ... 192.168.10.254

The network stations use a logical AND operation for the IP address and the subnetwork mask to determine whether there is a communication partner in the same network or in a different network. If the communication partner is in a different network, the standard gateway is addressed.

Standard gateway

The standard gateway is addressed via a 32-bit address. The 32-bit address is represented by four decimal numbers separated by points.

Example: 192.168.10.1

The standard gateway establishes a connection to other networks. In this way, a network station that wants to address another station can use a logical AND operation with the IP address and the subnetwork mask to decide whether the desired station is located in the same network. If this is not the case, the station addresses the standard gateway (router), which must be part of the actual network. The standard gateway then takes on the job of transmitting the data packages.

3.6 Setting the IP address

The address parameters are set as follows on delivery:

- IP address: 192.168.10.4
- Subnetwork mask: 255.255.255.0
- Standard gateway: 0.0.0.0

The DFE11B option card is set up for class C networks at the factory. You can divide the networks into any number of network addresses (e.g. 192.168.10) and node addresses (e.g. 4) by changing the IP address or the subnetwork mask. Note that the **IP address** within your network **must be unique** (e.g. 192.168.10.4).

You can set all the address parameters via the MOVIDRIVE® interfaces using:

- The MOVITOOLS® software
- The DBG60B keypad
- A Web browser

You can also set the least significant byte (LSB) of the IP address manually at the DIP switches. You also have the option to request all IP address parameters from a central DHCP server.

The address parameters are stored in a non-volatile memory on the MOVIDRIVE® MDX61B memory card. When replacing the DFE11B option card or MOVIDRIVE® MDX61B, all the address parameters are kept if the memory card is retained.

Changing the IP address during ongoing operation does not take effect immediately. The change only comes into effect when the inverter is switched on again (power supply + 24 V OFF/ON). The inverter displays the current IP address in the parameter group *P78x Ethernet configuration*.

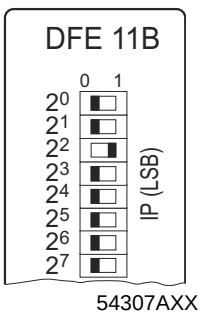
Enter the current IP address in the "IP" input field on the front of the DFE11B option. In this way, you can always access the correct inverter in the network e.g. in a control cabinet.

Setting the IP address using MOVITOOLS® or DBG60B

You can set the IP address using the MOVITOOLS® software or the DBG60B keypad. Set the DIP switches 2^0 to 2^7 to "0" to transfer the IP address you set using MOVITOOLS® or DBG60B.

Setting the IP address via a Web server

The parameters are listed on the DFE11B homepage → Sec. 6 "Integrated Web server") under the menu item Configuration -> IP Settings. If you want to use the menu to set the entire IP address, set all the DIP switches to 0.



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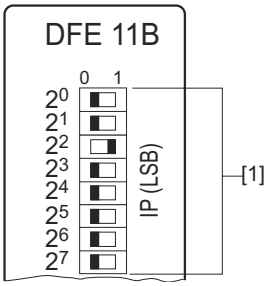
The least significant byte (LSB here: 4) of the IP address is set at the factory:

2^0 → Significance: $1 \times 0 = 0$
2^1 → Significance: $2 \times 0 = 0$
2^2 → Significance: $4 \times 1 = 4$
2^3 → Significance: $8 \times 0 = 0$
2^4 → Significance: $16 \times 0 = 0$
2^5 → Significance: $32 \times 0 = 0$
2^6 → Significance: $64 \times 0 = 0$
2^7 → Significance: $128 \times 0 = 0$

Setting the IP address manually

You can set the least significant byte of the IP address [1] using the DIP switches 2^0... 2^7 on the DFE11B option card (→ following figure).



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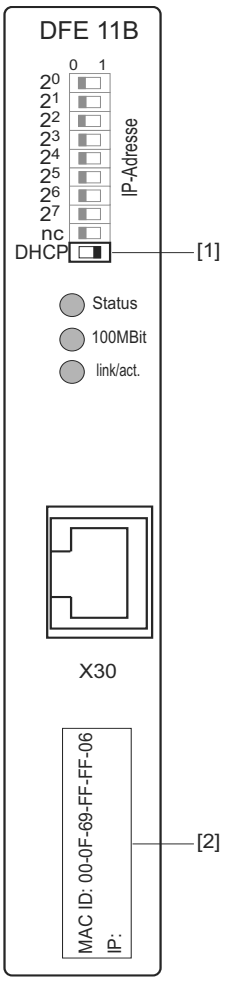
MOVIDRIVE® supports the address range 0...255. Note that the IP address within a network must be unique. Enter the top 3 bytes of the IP address, the subnetwork mask and the standard gateway in MOVITOOLS® or using the DBG60B keypad.

Note the following points:

- The IP address 255 cannot be set because it is a broadcast address.
- If you set the IP address 0, the least significant byte (LSB) of the IP address will also be transferred from the paramter settings (e.g. by MOVITOOLS® or DBG60B). The first 3 bytes are always taken from the parameter settings.

Setting the IP address via a DHCP server



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You can also assign the address parameters using the DHCP server (**D**ynamic **H**ost **C**onfiguration **P**rotocol server). Proceed as follows to configure MOVIDRIVE® MDX61B via the DHCP server:

- Set the "DHCP" DIP switch [1] on the DFE11B to "1" (switch position right)
- Configure MOVIDRIVE® MDX61B in the DHCP server with the DFE11B option primarily statically. Proceed as follows:
  - Enter the MAC address [2] of the DFE11B and the required values for the IP address, subnetwork mask and standard gateway. The MAC address [2] is different for each Ethernet station. The MAC address [2] is attached to the front panel of the DFE11B option.
  - When the LED "Status" of the DFE11B flashes yellow continuously, this means that the DFE11B is not receiving address parameters from the DHCP server. In this case, check your entries in the DHCP server.

If a fixed IP address should be assigned to the DFE11B via the DHCP server, note the IP address in the "IP" input field on the front of the DFE11B option. In this way, you can always access the correct inverter in the network e.g. in a control cabinet.

3.7 Operating mode displays for the DFE11B option

Ethernet LEDs There are three LEDs on the DFE11B option card that display the current status of the DFE11B option and the Ethernet system.

LED status (red/yellow/green)

- The LED **Status** shows the current status of the DFE11B option card.

Status	Meaning
Off	The DFE11B option card is either not supplied with voltage or it is faulty.
Red	There is an error in the DFE11B option card.
Yellow	The operating system of the DFE11B option card has been started.
Flashing yellow	The TCP / IP stack of the DFE11B option card has been started. If this status continues and you have activated the DHCP server (DIP switch 10 to "1"), the DFE11B option card waits for data from the DHCP server.
Green	Normal operating status after the DFE11B option card has been started.

LED 100MBit (green)

- The LED **100MBit** (green) shows the baud rate of the Ethernet connection.

Status	Meaning
On	There is an Ethernet connection with a baud rate of 100 MBit.
Off	There is an Ethernet connection with a baud rate of 10 MBit. If the LED Link/Activity is also off there is no Ethernet connection.

LED Link/Activity (green)

- The LED **Link/Activity** (green) shows the status of the Ethernet connection.

Status	Meaning
On	There is an Ethernet connection.
Flickering	Data is currently being exchanged via Ethernet.
Off	There is no Ethernet connection.

- As the firmware of the DFE11B option card is required for ca. 30 seconds for initialization, the status "0" (inverter not ready) is displayed in the 7-segment display of MOVIDRIVE® during this time.
- The LEDs on the DFE11B display the following:
  - LED status → Yellow
  - LED 100MBit → OFF
  - LED Link/Activity → Green

4 Project Planning and Startup

This section describes how to configure and start up the MOVIDRIVE® MDX61B drive inverter with the DFE11B option.

4.1 Startup of the drive inverter

After installing the fieldbus option card, the MOVIDRIVE® drive inverter can be parameterized immediately via the fieldbus system without any additional settings. For example, all parameters can be set by the master programmable controller after power-on.

However, to control the drive inverter via the Ethernet system, the drive inverter must first be switched to control signal source and setpoint source = FIELDBUS. The FIELDBUS setting means the inverter parameters are set for control and setpoint transfer from the Ethernet. The drive inverter then responds to the process output data sent by the master programmable controller.

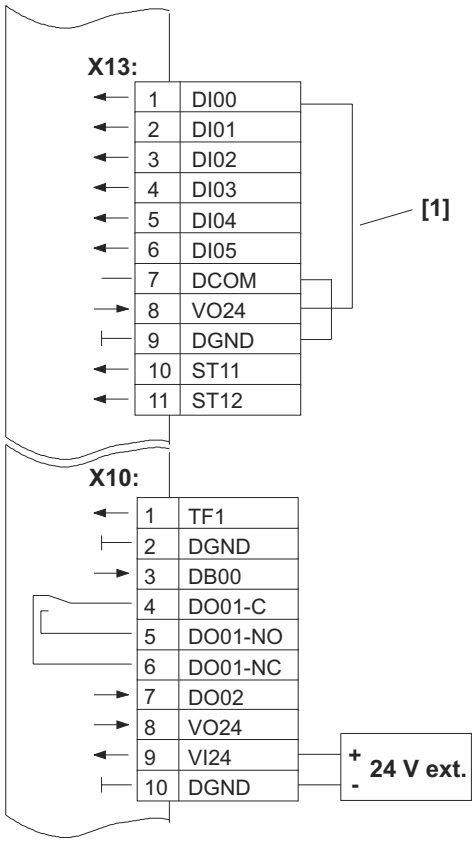
Activation of the control signal source/setpoint source FIELDBUS is signaled to the higher-level controller using the "Fieldbus mode active" bit in the status word. For safety reasons, the drive inverter must also be enabled at the terminals for control via the fieldbus system. Consequently, the terminals must be wired or programmed in such a way that the inverter is enabled via the input terminals.

The simplest way of enabling the drive inverter at the terminals is to connect the DIØØ (function /CONTROLLER INHIBIT) input terminal to a +24 V signal and to program input terminals DIØ1 ... DIØ5 to NO FUNCTION. The following section shows by way of example how to startup the MOVIDRIVE® drive inverter with fieldbus interface.

Procedure for startup of the MOVIDRIVE® MDX61B

1. Enable the power output stage at the terminals.

   Connect the input terminal DIØØ / X13.1 (function /CONTROLLER INHIBIT) to a +24 V signal (for example, using a device jumper).



DI00 = Controller inhibit
DI01 = no function
DI02 = no function
DI03 = no function
DI04 = no function
DI05 = no function
DCOM = Reference X13: DI00 ... DI05
VO24 = + 24 V
DGND = Reference pot. for binary signals
ST11 = RS-485 +
ST12 = RS-485 -
TF1 = TF input
DGND = Reference pot. for binary signals
DB00 = Brake
DO01-C = Relay contact
DO01-NO = Normally open contact relay
DO01-NC = Normally closed contact relay
DO02 = /Malfunction
VO24 = + 24 V
VI24 = + 24 V (external supply)
DGND = Reference pot. for binary signals

Enabling the power output stage via unit jumper [1]
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2. Turn on the external 24 V voltage supply (not mains voltage supply!).

   You can now configure the drive inverter.

3. Setpoint source = FIELDBUS / control signal source = FIELDBUS.

   Set the setpoint source and control signal source parameters to FIELDBUS to control the drive inverter via a fieldbus.

P100 Setpoint source = FIELDBUS
P101 Control signal source = FIELDBUS

4. Input terminals DIØ1 ... DIØ5 = NO FUNCTION.

   Set the function of the input terminals to NO FUNCTION.

P600 Terminal programming DIØ1 = NO FUNCTION
P601 Terminal programming DIØ2 = NO FUNCTION
P602 Terminal programming DIØ3 = NO FUNCTION
P603 Terminal programming DIØ4 = NO FUNCTION
P604 Terminal programming DIØ5 = NO FUNCTION

For more information on startup and control of the MOVIDRIVE® drive inverter, refer to the "MOVIDRIVE® Fieldbus Unit Profile" manual.

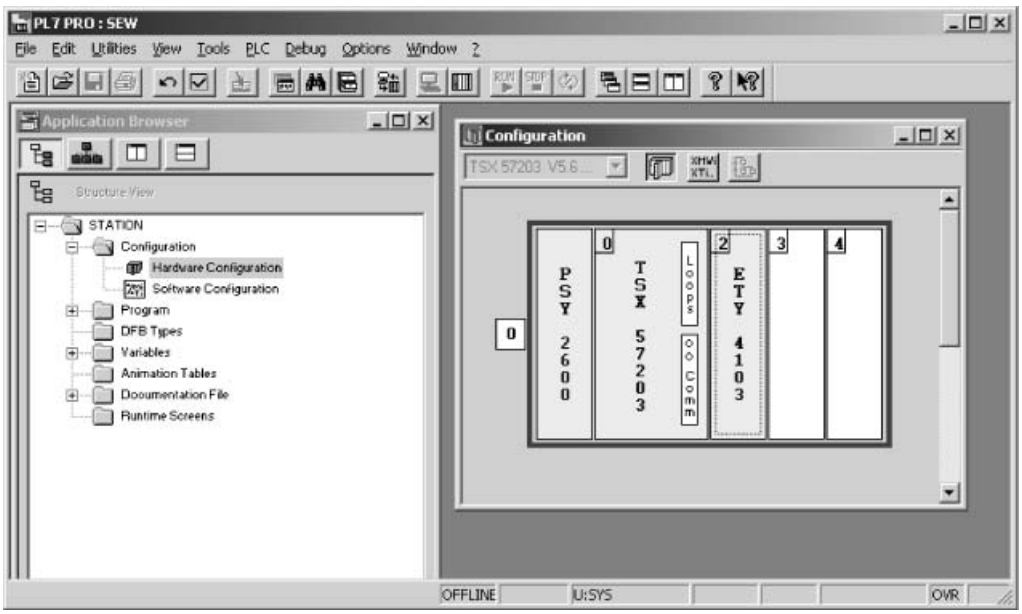
4.2 Configuring the master (Modbus scanner)

The first example refers to the configuration and programming of a Schneider Electric control system TSX Premium P57203 using the programming software PL7 PRO. An ETY4103 is used as the Ethernet component. The information and illustrations are based on the English version of the PL7 PRO software.

Enter values in PL7 PRO using the keypad.

Hardware configuration

- Start PL7 PRO and enter the control type.
- Enter the hardware configuration for the control system in the application browser under `STATION / Configuration / Hardware Configuration` .



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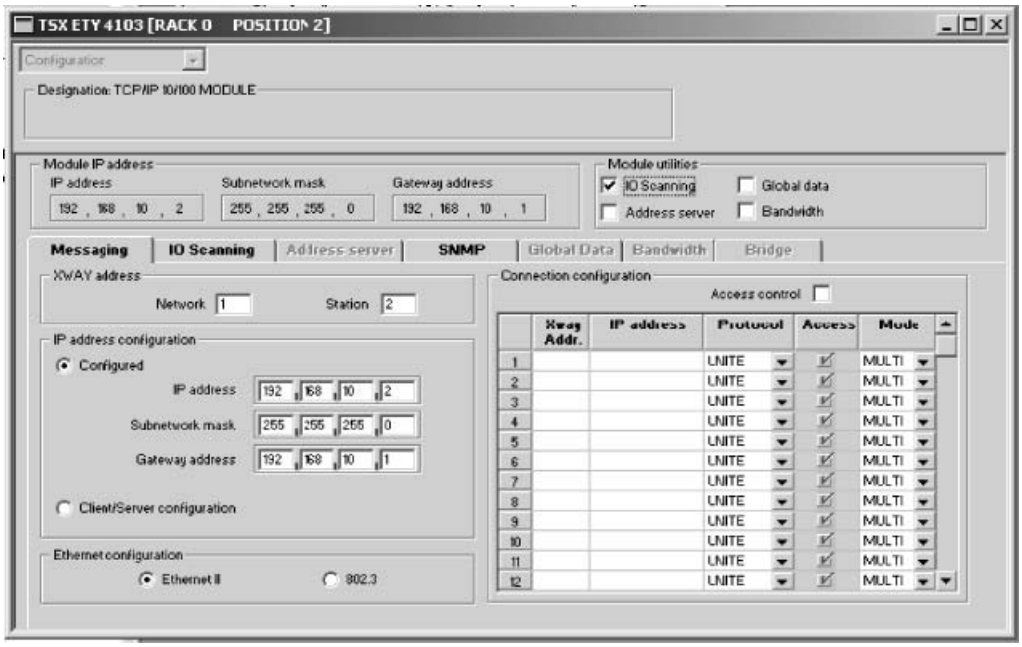
Settings for the Ethernet component

- Double-click on the Ethernet component to open the configuration window.
- If you have a non-extendable rack, enter a "1" in the "Network" input field in the "XWAY address" section.
- Enter the number of the slot that the Ethernet component is plugged into (here: 2) in the input field "Station" in the "XWAY address" section. In this case, the XWAY address is 1.2.
- In the section "IP address configuration" select the radio button "Configured". Enter the IP address and the network parameters in the input fields "IP address", "Subnetwork mask" and "Gateway address". If the control system is to receive the address parameters via a DHCP server, select the radio button "Client/Server configuration" in the section "IP address configuration".
- In the "Ethernet configuration" section, select the radio button "Ethernet II".
- In the "Module utilities" section, select the check box "IO Scanning".



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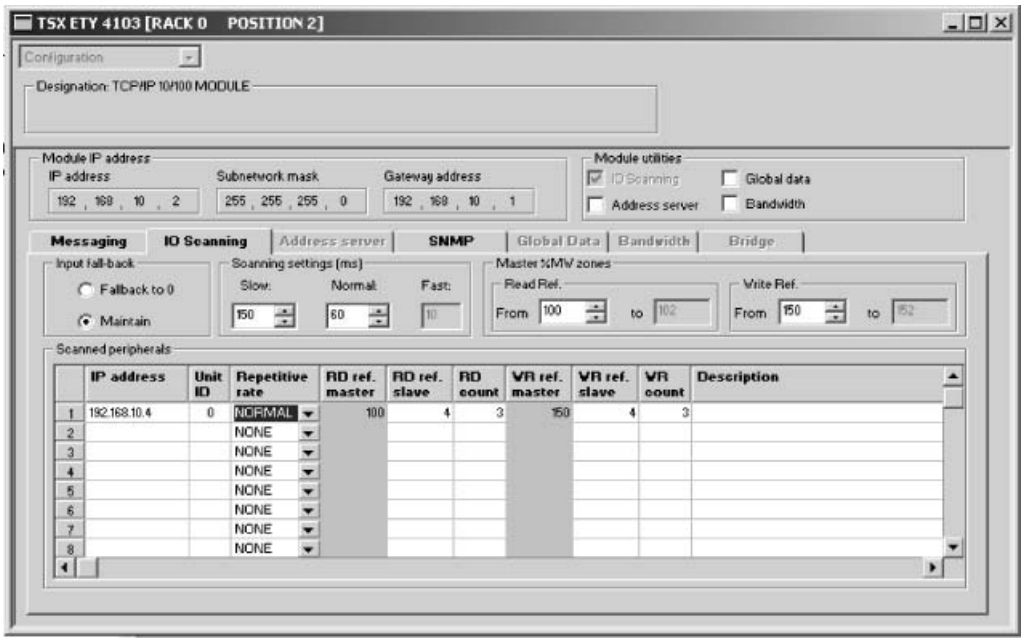
Addressing the drive using IO scanning

- Choose the "IO Scanning" tab page. In this tab page you specify which of the stations connected to the Modbus are to exchange cyclical data.
- In the section "Master %MW zones" enter the control memory areas that are to be used to exchange cyclical data with the Modbus stations. You will use the memory addresses later in your PLC program.
- Enter the following in the "Scanned peripherals" group:
  - In the "IP address" input field, enter the IP address of the SEW drive.
  - In the "Unit ID" input field, enter the value "0".
  - In the "Repetitive rate" dropdown menu, enter the cycle time that is used to address the stations.
  - Enter the value "4" in the input fields "RD ref.slave" and "WR ref. slave" as the cyclical data are available from offset 4.
  - In the input fields "RD count" and "WR count" enter the number of words to be exchanged. The values must be the same in both fields. For the DFE11B option you can enter between 1 and 10 words.



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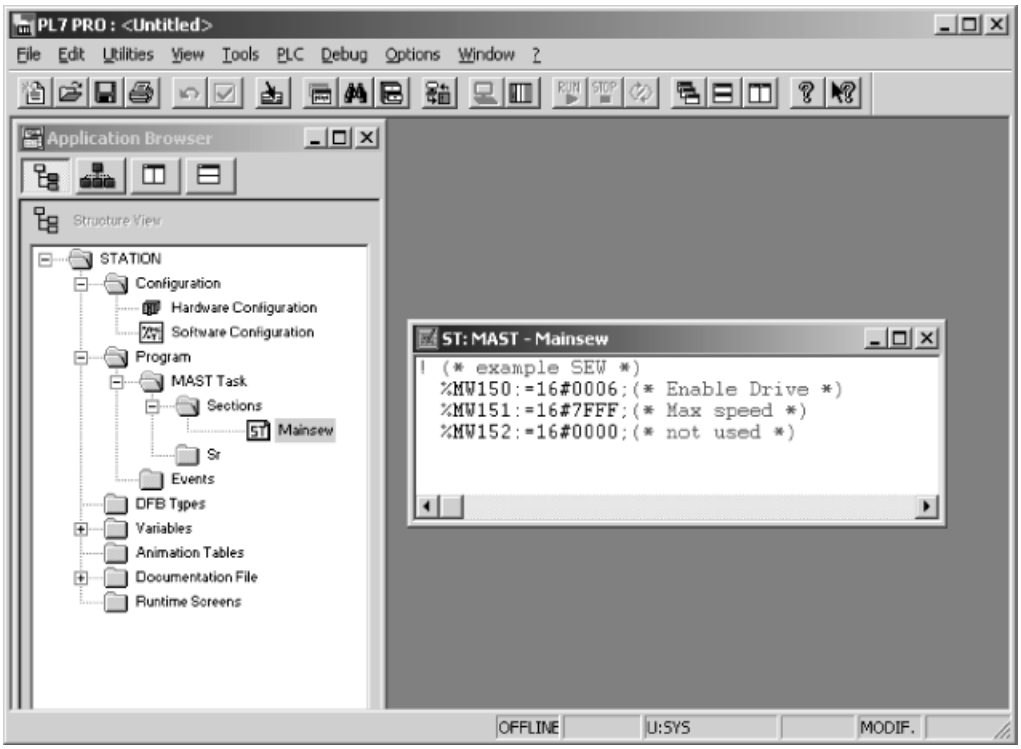
- Click on the button "Confirm √" to confirm the rack configuration and the global configuration.
- Once you have transferred your settings and started the program, the LED "Link/Activity" on the DFE11B lights up cyclically (→ Sec. "Operating mode displays for the DFE11B option").

Creating programs

- Create a new section in PL7 PRO in the application browser under `Station / Program / Mast Task / Sections`.
- The setpoints for the drive start from MW150 (→ following figure). Before leaving the factory, the first word is assigned the control word, the second the speed and the third word has no assignment. For the coding of the setpoints and actual values refer to the fieldbus unit profile and the list of parameters.



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Additional information for control systems from Schneider Electric

As the Ethernet, use busmaster components from Schneider Electric that support I/O Scanning. The Modbus / TCP interface module for SEW drives cannot be addressed via "Peer Cop". However, Ethernet-Busmasters that only support "Peer Cop" can access the drives from the PLC program using read and write commands.

5 Operating Characteristics of Modbus / TCP

5.1 Introduction

Modbus / TCP is an open protocol based on TCP / IP. It has become established as the standard solution for industrial Ethernet interface modules. Modbus / TCP uses port 502. The following service FCs (**F**unction **C**odes) are available for process data exchange, parameter data exchange and unit identification:

- FC3 – Read Holding Registers
- FC16 – Write Multiple Registers
- FC23 – Read Write Multiple Registers
- FC43 – MEI, Type 0x0E "Read Device identification"

A bus station is represented as a coherent register block via Modbus / TCP. The register block can include up to 64 k words and is addressed from reference number (= offset) 0. This register block contains the process data of the frequency inverter and a parameter channel. Services FC3, FC16 and FC23 are suitable for the cyclical exchange of process data with the Modus master (client). We recommend you use service FC23. The DFE11B option card can exchange up to ten process data words with the Modbus master (client) (→ Sec. "Mapping").

Protocol structure

Byte	Designation	Meaning
0	Transaction identifier	Often 0, is simply copied by the server (slave)
1	Transaction identifier	Often 0, is simply copied by the server (slave)
2	Protocol identifier	0
3	Protocol identifier	0
4	Length field (upper byte)	0
5	Length field (lower byte)	Number of following bytes
6	Unit identifier (slave address)	0 or FF_{hex}
7	Function code	Required service, e.g. FC23
..	Data	Depends on the service

The transaction identifier is assigned by the master (client) and simply copied by the slave (server). The protocol identifier must be zero. The length specifies the number of following bytes. The unit identifier must be 0 or FF_{hex}, which means that the DFE11B end station is on the bus and does not function as a gateway. The required function code is entered in byte 7. The data bytes after byte 8 depend on the function code selected.

5.2 Mapping

The following table shows how the data is stored in the register mapping of the Modbus.

Offset	Meaning for read operation	Meaning for write operation	Remarks
0_{hex} - 3_{hex}	Reserved	Reserved	No access
4_{hex} - D_{hex}	Process input data (actual values)	Process output data (setpoints)	Max. 10 words for MDX61B Access via FC3, FC16, FC23
100_{hex} - 109_{hex}	Process output data (setpoints)	Reserved	Max. 10 words for MDX61B Access via FC3
200_{hex} - $2FF_{hex}$	Result acyclical parameter channel	Request acyclical parameter channel	4 words for MDX61B Access via FC3, FC16, FC23
300_{hex} - $FFFF_{hex}$	Reserved	Reserved	No access

The process data words start, for example, from reference number (offset) 4. Setpoints can be specified, for example, using a write access from 1 to 10 words from reference number (= offset) 4. The reference numbers (= offsets) 0 to 3 are reserved. The process output data (setpoints) can also be read from offset 100_{hex} (256_{dec}). The acyclical parameter channel comprises 4 words and can be used for parameter data exchange with the frequency inverter. It is located at 200_{hex} (512_{dec}).

Notes for control systems from Schneider Electric: The address range often starts at 40001_{hex}. This corresponds to the value "0" for the offset.

5.3 Controlling the drive inverter

Process data exchange with FC3 "Read Holding Registers"

You can use FC3 to read 1 ... 10 process input data words (actual values) from the inverter or to query the current value of 1 ... 10 process output data words. The process input data words are located in reference number (offset) 4. The process output data words are located in reference number (offset) 100_{hex}.

For control, we recommend that you use FC23 for process data exchange with the control system. It allows you to read and write process data simultaneously with optimized timing.

Example

Reading 3 process input data words (actual values).

Query

Byte	Designation	Meaning	E.g. Read 3 words
0	Transaction identifier	Often 0, is simply copied by the server (slave)	0
1	Transaction identifier	Often 0, is simply copied by the server (slave)	0
2	Protocol identifier	0	0
3	Protocol identifier	0	0
4	Length field (upper byte)	0	0
5	Length field (lower byte)	Number of following bytes	6
6	Unit identifier (slave address)	0 or FF_{hex}	0
7	Function code	Service: FC3	3
8	Reference number (high)	0	0
9	Reference number (low)	From offset 4	4
10	Word count (high)	Number of words (register)	0
11	Word count (low)	Number of words (register)	3

Response

Byte	Designation	Meaning	E.g. Read 3 words
0	Transaction identifier	Often 0, is simply copied by the server (slave)	0
1	Transaction identifier	Often 0, is simply copied by the server (slave)	0
2	Protocol identifier	0	0
3	Protocol identifier	0	0
4	Length field (upper byte)	0	0
5	Length field (lower byte)	Number of following bytes	9
6	Unit identifier (slave address)	0 or FF_{hex}	0
7	Function code	Service: FC3	3
8	Byte count	Number of following bytes	6
9..	Data	2 - ... data bytes depending on the length	2 (e.g. status word 1 High)
...	Data	Data bytes depending on the length	6 (e.g. status word 1 Low)
...	Data	Data bytes depending on the length	0 (e.g. Speed high)
...	Data	Data bytes depending on the length	0 (e.g. Speed low)
...	Data	Data bytes depending on the length	0 (e.g. Current high)
...	Data	Data bytes depending on the length	0 (e.g. Current low)

Process data exchange with FC16 "Write Multiple Registers"

You can use FC16 to write one to ten process output data words (setpoints) to the inverter. The process output data words are in reference number (offset) 4.

For control, we recommend that you use FC23 for process data exchange with the control system. It allows you to read and write process data simultaneously with optimized timing.

Example

Writing 3 process output data words (setpoints).

Query

Byte	Designation	Meaning	Example: Write 3 words
0	Transaction identifier	Often 0, is simply copied by the server (slave)	0
1	Transaction identifier	Often 0, is simply copied by the server (slave)	0
2	Protocol identifier	0	0
3	Protocol identifier	0	0
4	Length field (upper byte)	0	0
5	Length field (lower byte)	Number of following bytes	13
6	Unit identifier (slave address)	0 or FF_{hex}	0
7	Function code	Service: FC16	16
8	Reference number (high)	Offset	0
9	Reference number (low)	Offset	4
10	Word count (high)	Number of words (register)	0
11	Word count (low)	Number of words (register)	3
12	Byte count	2* Word count	6
13 ...	Register values	Data bytes depending on the length	0 (e.g. control word 1 high)
...	Register values	Data bytes depending on the length	6 (e.g. control word 1 low)
...	Register values	Data bytes depending on the length	0 (e.g. Speed high)
...	Register values	Data bytes depending on the length	0 (e.g. Speed low)
...	Register values	Data bytes depending on the length	0 (e.g. Ramp high)
...	Register values	Data bytes depending on the length	0 (e.g. Ramp high)

Response

Byte	Designation	Meaning	E.g. Write 3 words
0	Transaction identifier	Often 0, is simply copied by the server (slave)	0
1	Transaction identifier	Often 0, is simply copied by the server (slave)	0
2	Protocol identifier	0	0
3	Protocol identifier	0	0
4	Length field (upper byte)	0	0
5	Length field (lower byte)	Number of following bytes	6
6	Unit identifier (slave address)	0 or FF_{hex}	0
7	Function code	Service: FC16	3
8	Reference number (high)	Offset	0
9..	Reference number (low)	Offset	4
10	Word count (high)	Number of words (register)	0
11	Word count (low)	Number of words (register)	3

Process data exchange with FC23 "Read/Write Multiple Registers"

You can use FC23 to write one to ten process data words to the inverter and read them from the inverter simultaneously. The process data words are in reference number (offset) 4. Only offset 4 is permitted for process data exchange. *Read Word Count* and *Write Word Count* must be set to the same value.

Example

Writing 3 process output data words and reading 3 process input data words.

Query

Byte	Designation	Meaning	E.g. Exchange 3 words
0	Transaction identifier	Often 0, is simply copied by the server (slave)	0
1	Transaction identifier	Often 0, is simply copied by the server (slave)	0
2	Protocol identifier	0	0
3	Protocol identifier	0	0
4	Length field (upper byte)	0	0
5	Length field (lower byte)	Number of following bytes	17
6	Unit identifier (slave address)	0 or FF_{hex}	0
7	Function code	Service: FC23	23
8	Read reference number (high)	Offset	0
9	Read reference number (low)	Offset	4
10	Read word count (high)	Number of words (register)	0
11	Read word count (low)	Number of words (register)	3
12	Write reference number (high)	Offset	0
13	Write reference number (low)	Offset	4
14	Write word count (high)	Number of words (register)	0
15	Write word count (low)	Number of words (register)	3
16	Write byte count (low)	2* Word count	6
17..	Write register values	Data bytes depending on the length	0 (e.g. control word 1 high)
...	Write register values	Data bytes depending on the length	6 (e.g. control word 1 low)
...	Write register values	Data bytes depending on the length	0 (e.g. Speed high)
...	Write register values	Data bytes depending on the length	0 (e.g. Speed low)
...	Write register values	Data bytes depending on the length	0 (e.g. Ramp high)
...	Write register values	Data bytes depending on the length	0 (e.g. Ramp high)

Response

Byte	Designation	Meaning	Exch. 3 words
0	Transaction identifier	Often 0, is simply copied by the server (slave)	0
1	Transaction identifier	Often 0, is simply copied by the server (slave)	0
2	Protocol identifier	0	0
3	Protocol identifier	0	0
4	Length field (upper byte)	0	0
5	Length field (lower byte)	Number of following bytes	9
6	Unit identifier (slave address)	0 or FF_{hex}	0
7	Function code	Service: FC23	23
8	Byte count	Number of following bytes	6
9..	data	2 - .. Data bytes depending on the length	2

5.4 Process data timeout

The MOVIDRIVE® MDX61B drive inverter expects setpoints to be written regularly via FC16 or FC23 from the Modus master. If the data transfer via Modbus / TCP is interrupted, the fieldbus timeout time in the MOVIDRIVE® MDX61B runs down. MOVIDRIVE® MDX61B displays fault 28 *Fieldbus Timeout*. At the same time, the drive inverter performs the fault response selected with *P831 Fieldbus timeout response*. Parameter *P819 Fieldbus Timeout* displays the adjustable monitoring time.

5.5 Response fieldbus timeout

Parameter *P831 Response Fieldbus Timeout* is used to set the fault response that is triggered via the fieldbus timeout monitoring function.

5.6 Setting parameters via Modbus / TCP

The following table shows the structure of the MOVILINK® acyclic parameter channel. It contains 8 bytes.

Offset	200_{hex}	200_{hex}	201_{hex}	201_{hex}	202_{hex}	202_{hex}	203_{hex}	203_{hex}
Meaning	Manage-ment	Reserved	Index High	Index Low	MSB data	Data	Data	LSB data
Comment	Manage-ment	Reserved	Parameter index		4-byte data			

You can access the parameter channel with FC3, FC16 and FC23. You can inform the parameter channel of the task in the administration byte using a write access. The task itself is a MOVILINK® service such as, write, write volatile or read. The result can be read with a read access. Refer to the MOVIDRIVE® "Fieldbus Unit Profile and Parameter List" documentation for information on the structure of the parameter channel.

Parameter channel performs a write service

If a write type service is executed via the acyclic parameter channel (e.g. write parameter or write parameter volatile), the inverter responds with the current service confirmation after the service has been executed. An incorrect write access returns the corresponding error code.

This option offers the advantage that the write service can be processed upon sending a single WRITE "MOVILINK® parameter channel" and the service confirmation can be accomplished by evaluating the "Write Response." The following table shows the execution of write services via the acyclic MOVILINK® parameter channel.

Control (Modbus master)	**MOVIDRIVE® with DFE11B option**
1. Initiate the execution of the service coded in the parameter channel with WRITE (FC16) to the "MOVILINK® acyclic parameter channel".	
WRITE to offset 200 (parameter channel) →	
← Service confirmation (OK/error code)	

Parameter channel performs a read service

To read a parameter via the parameter channel, it is necessary to execute a Modbus WRITE service (FC16 or FC23) first. The master uses a WRITE service to enter a MOVILINK® read service in the administration byte. As soon as the program exits the Modbus WRITE service, the result can be read back using FC3. The following table shows how read services are performed via the acyclical MOVILINK® parameter channel.

Control (Modbus master)	MOVIDRIVE® with DFE11B option
1. Initiate the execution of the service coded in the parameter channel with the WRITE service (FC16) to the "MOVILINK® acyclic parameter channel".	
WRITE to offset 200_{hex} (parameter channel) →	
← OK	
2. READ (FC3) "MOVILINK® acyclic parameter channel" and evaluation of service confirmation in the parameter channel.	
READ to offset 200_{hex} (parameter channel) →	
← Data = parameter channel with result	

With FC23 the result is returned directly in the response

Control (Modbus master)	MOVIDRIVE® with DFE11B option
1. Initiate the execution of the service coded in the parameter channel with WRITE (FC23) to the "MOVILINK® acyclic parameter channel" and evaluate the service confirmation in the parameter channel.	
WRITE to offset 200_{hex} (parameter channel) →	
← Data = parameter channel with result	

Additional information for control systems from Schneider Electric

Example for reading index 8300 (firmware part number):

For most control systems, access to the parameter channel is performed word-by-word in BIG ENDIAN coding.

1. Write 4 words from offset 200:
   - Offset 200 = 3100_{hex} (administration = read 4 bytes / reserved = 0)
   - Offset 201 = $206C_{hex}$ (Index = 8300)
   - Offset 202 = 0 (Data high)
   - Offset 203 = 0 (Data low)
2. Read 4 words from offset 200:
   - Offset 200 = 3100_{hex} (administration = no error / reserved = 0)
   - Offset 201 = $206C_{hex}$ (Index = 8300)
   - Offset 202 = 3191_{hex} (Data high)
   - Offset 203 = $41CF_{hex}$ (Data low)

Comment: $319141CF_{hex} = 831603151_{dec}$.

5.7 Device identification with FC43 "MEI / Read Device Identification"

The service *FC43* is also referred to as MEI (**M**ODBUS **E**ncapsulated **I**nterface Transport). It can tunnel services and method calls. The service *Read Device Identification* is tunneled with the MEI *Type 0x0E*. There are 3 blocks that can be read: *Basic*, *Regular* and *Extended*. The DFE11B option supports the *Basic* and *Regular* blocks (conformity level 2). The entire block is always read (streaming). This means that values 01 and 02 are permitted in the *Read device ID code* The *Object ID* must be zero. The response is not fragmented.

Objects

ID	Name	Type	M/O	Category	Value (example)
0x00	VendorName	ASCII String	Mandatory	Basic	"SEW-EURODRIVE"
0x01	ProductCode	ASCII String	Mandatory	Basic	"MDX61B0008-5A3-4-00"
0x02	MajorMinorRevision	ASCII String	Mandatory	Basic	"823 568 0.10"
0x03	VendorUrl	ASCII String	Option	Regular	"www.sew.de"
0x04	ProductName	ASCII String	Option	Regular	"MOVIDRIVE"
0x05	ModelName	ASCII String	Option	Regular	"B"

Query

Byte	Designation	Meaning	E.g. Read basic object
0	Transaction identifier	Often 0, is simply copied by the server (slave)	0
1	Transaction identifier	Often 0, is simply copied by the server (slave)	0
2	Protocol identifier	0	0
3	Protocol identifier	0	0
4	Length field (upper byte)	0	0
5	Length field (lower byte)	Number of following bytes	5
6	Unit identifier (slave address)	0 or FF_{hex}	0
7	Function code	Service: FC43	43
8	MEI type	0x0E	14
9	Read device ID code	01 or 02	1
10	Object ID	0	0

Response

Byte	Designation	Meaning	E.g. Read basic object
0	Transaction identifier	Often 0, is simply copied by the server (slave)	0
1	Transaction identifier	Often 0, is simply copied by the server (slave)	0
2	Protocol identifier	0	0
3	Protocol identifier	0	0
4	Length field (upper byte)	0	0
5	Length field (lower byte)	Number of following bytes	X
6	Unit identifier (slave address)	0 or FF_{hex}	0
7	Function code	Service: FC43	43
8	MEI type	0x0E	14
9	Read device ID code	01 or 02	1
10	Conformity level	02	2
11	More follows	0	0
12	Next object ID	0	0
13	Number of objects	e.g. 3	3
14	Object ID		0
15	Object length		X
16	Object value		0
17	...		...

6 Integrated Web Server

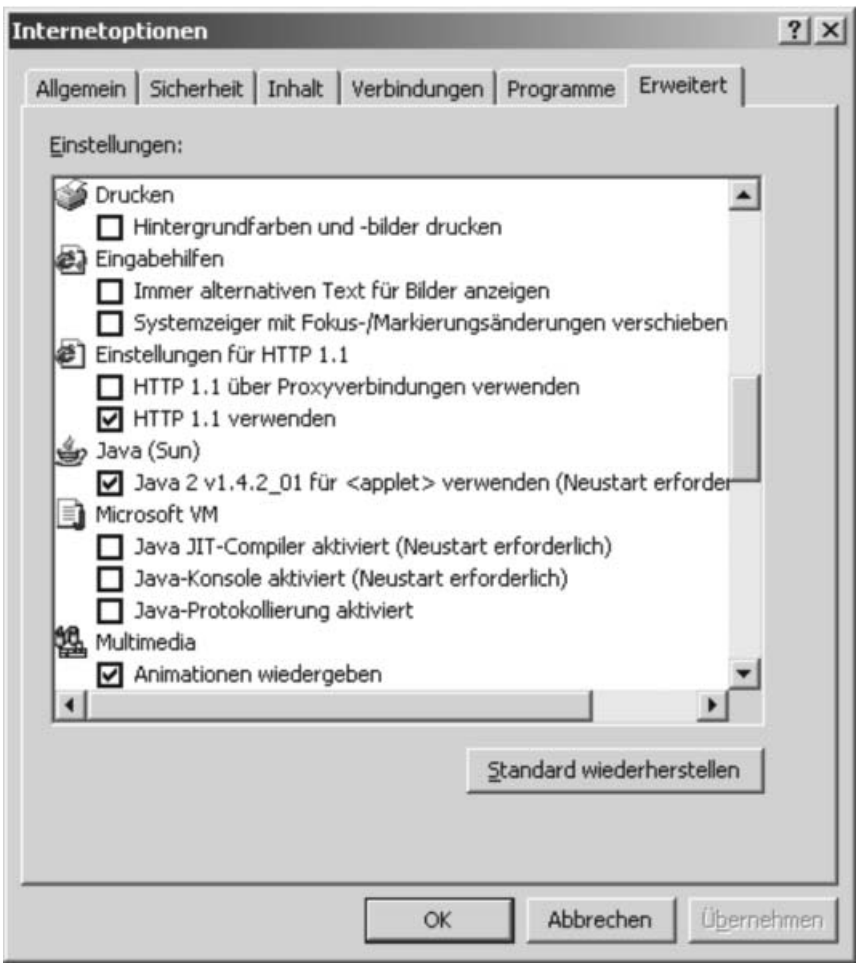
The DFE11B option card has a homepage prepared by SEW-EURODRIVE. To access the homepage, start your browser and enter, for example, the following IP address of the DFE11B:

http://192.168.10.4

The web pages give you access to service and diagnostics information and the short documentation to DFE11B.

6.1 Software requirements

The DFE11B homepage has been tested with Microsoft® Internet Explorer 5.0 and Netscape® Navigator 7.1. To display dynamic elements you will need the Java 2 Runtime Environment SE, V1.4.2 or above. To download Java for your operating system from the Internet, choose "Free Downloads" from the web sites *www.java.com* or *www.java.sun.com/j2se/*. In Microsoft® Internet Explorer you have to deactivate all the options listed under the heading Microsoft® VM. To do so, choose [Extras] / [Internet Options] / [Advanced]



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6.2 Access protection

Access to the drive parameters and diagnostics information can be protected by a password. The access protection is deactivated as standard. You can activate access protection by assigning a password. You can deactivate it again by deleting the password (→ button "Change Password" on the homepage for MOVIDRIVE® MDX61B with the DFE11B option).

If password protection is activated you will be asked to enter your password. You can use the observer login to have read access to all the inverter parameters. You can use the maintenance login to have read and write access to all the inverter parameters. You can enter different passwords for both types of login. If you only enter a password for the observer login, it will also be used for the maintenance login.

6.3 Design of the MOVIDRIVE® MDX61B with the DFE11B option homepage

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[1] Main window

[2] Navigation buttons

[3] Status of MOVIDRIVE® MDX61B

[4] Menu tree with submenus

6.4 Navigation options

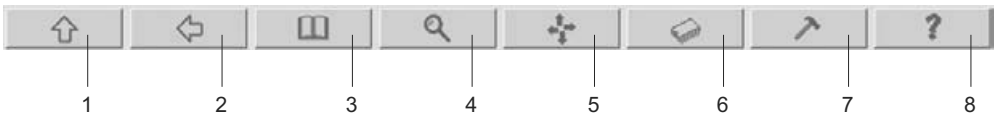
The following navigation options are available on the homepage:

- Main window
- Navigation buttons
- Menu tree with submenus

In the **main window** you can navigate through the site by clicking on the underlined link.

In the **menu tree** you can open the submenus by clicking on the plus symbol. Click on a menu entry to display additional submenus or parameter values in the main window.

Click on the **navigation buttons** (→ following figure) to go directly to each main menu.



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[1] Information
[2] Back
[3] Information
[4] Diagnostics
[5] Control
[6] Configuration
[7] Tools
[8] Help

- **Information**

  Displays the connected inverter type and contact information for SEW-EURODRIVE.
- **Diagnostics**

  This menu item guides you to the inverter display values.
- **Control**

  Reserved for future applications.
- **Configuration**

  Allows you to set selected inverter parameters.
- **Tools**

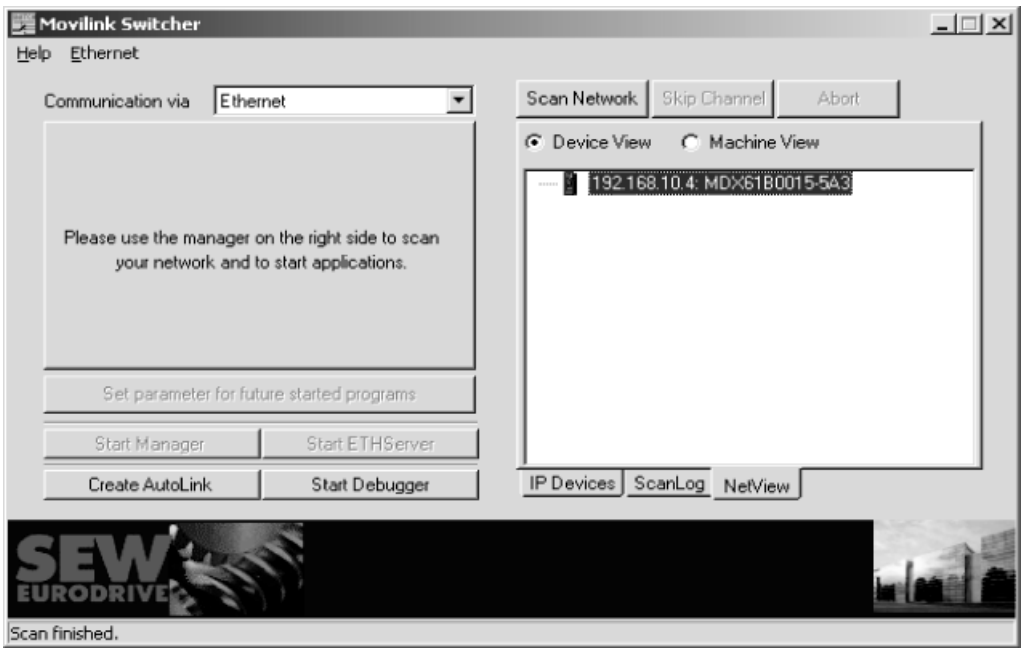
  Directs you to SEW-EURODRIVE's website where you can download the latest version of the MOVITOOLS® software (→ MOVITOOLS® via Ethernet).
- **Help**

  Includes a brief description of the DFE11B option. To be able to read the documentation you must have the Acrobat Reader installed on your PC.

7 MOVITOOLS® via Ethernet

The MOVITOOLS® operating software (version 4.20 or above) enables straightforward parameter setting, visualization and diagnostics for your drive application. You can use MOVITOOLS® to communicate with the MOVIDRIVE® MDX61B drive inverter via the DFE11B option card.

- In the MOVITOOLS® program group start the subprogram `ML-Switcher`.
- Choose "Ethernet" from the [Communication via] dropdown menu.
- In the input field "Broadcast Address", enter the network section of your IP address, for example 192.168.10. Enter 255 as the node address. The complete broadcast address is 192.168.10.255.
- Click the button <Scan Network>. A list of all the SEW drive inverters available in the network and their IP addresses is displayed.
- Choose the tab page <NetView>. The drive inverters connected in the network are displayed (→ following figure).
  - If you select the option *Device View*, all the drive inverters are displayed with their type designations.
  - If you choose the option *Machine View*, the logical identification of the drive inverters is displayed. You can assign the logical identification to drive inverters in the program Shell under [Display] / [Signature].



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- Select a drive. Click the right mouse button and start the MOVITOOLS® application you require from the context menu that appears.

Access protection

Access to the drive parameters and diagnostics information can be protected by a password. The access protection is deactivated as standard. You can activate the access protection function by assigning a password. Delete the password to deactivate the function again. You can change the password in the MOVILINK® Switcher by choosing [Ethernet] / [Settings]. Enter the IP address of the drive inverter and a password of your choice.

If password protection is activated you will be asked to enter your password. There are two levels of protection. You can use the observer login to have read access to all the inverter parameters. You can use the maintenance login to have read and write access to all the inverter parameters. You can enter different passwords for both types of login. If you only enter a password for the observer login, it is also used for the maintenance login.

8 Ethernet Configuration Parameters

8.1 Parameter description

The parameter group P78x includes display and setting values that are specific to the DFE11B option.

P780 IP address

Setting range: 1.0.0.0 - 223.255.255.255

Factory setting: 192.168.10.x

Use P780 to set the IP address for linking MOVIDRIVE® via Ethernet. The IP address consists of 4 bytes in decimal form separated by dots. The first 3 bytes of the IP address are specified in the menu. The last byte is set using the DIP switch (2^0 ... 2^7) on the DFE11B option card. If the DIP switches (2^0 ... 2^7) are set to "0", the last byte of the IP address can also be specified via P780. If the DHCP is activated via the DIP switch, the value specified by the DHCP server will be displayed.

P781 Subnetwork mask

Setting range: 0.0.0.0 - 255.255.255.255

Factory setting: 255.255.255.0

The subnetwork mask divides the network into subnetworks. The set bits determine which part of the IP address represents the address of the subnetwork. If the DHCP is activated via the DIP switch, the value specified by the DHCP server will be displayed.

P782 Standard gateway

Setting range: 1.0.0.0 - 223.255.255.255

Factory setting: 0.0.0.0

The standard gateway is addressed if the desired communication partner is not within the actual network. The standard gateway will have to be part of the actual network. If the DHCP is activated via the DIP switch, the value specified by the DHCP server will be displayed.

P783 Baud rate

Display value that cannot be changed. The current baud rate of the Ethernet connection is displayed. During the initialization phase of the DFE11B, the value "0" is displayed for approximately 30 seconds.

P784 MAC ID

Display value that cannot be changed. Displays the MAC ID; that is, the unique Ethernet address of the interface module.

9 Technical Data

9.1 DFE11B option

DFE11B option	
Part number	1820 036 2
Power consumption	P = 3 W
Application protocol	• **MODBUS/TCP** (Transmission Control Protocol) to control and set parameters for the drive inverter. • **HTTP** (Hypertext Transfer Protocol) for diagnostics using a Web browser. • **SMLP** (Simple Movilink Protocol), protocol used by MOVITOOLS®. • **DHCP** (Dynamic Host Configuration Protocol) to assign address parameter automatically.
Port numbers used	• 502 (MODBUS) • 300 (SMLP) • 80 (HTTP) • 67 / 68 (DHCP)
ISO / OSI layer 2	Ethernet II
Automatic baud rate detection	10 MBaud / 100 MBaud
Connection technology	RJ45 modular jack 8-8
Addressing	4 byte IP address
Tools for startup	• MOVITOOLS® software package from version 4.20 • DBG60B keypad
Firmware status of MOVIDRIVE® MDX61B	Firmware status 824 854 0.11 or above (→ display with P076)

10 Glossary

Term	Meaning
DHCP	**D**ynamic **H**ost **C**onfiguration **P**rotocol. Allows you to allocate an IP address and additional configuration parameters for automation components in a network via a server.
TCP	**T**ransmission **C**ontrol **P**rotocol. Acknowledged connection-oriented transport protocol.
UDP	**U**ser **D**atagram **P**rotocol. Non-acknowledged, connectionless transport protocol.
IP	**I**nternet **P**rotocol. Protocol for data transport in the Internet.
IP address	An IP address consists of 32 bits divided into four so called octets containing 8 bits each for the sake of clarity. These values are displayed as four decimal numbers separated by points, for example, "192.168.1.1". An IP address is subdivided into the network section (net ID) and the node address (host ID)
Subnetwork mask	The subnetwork mask establishes which part of the IP address is used to address the network and which part is used to address a station (host). All bits set to 1 in the subnetwork mask represent the network part (net ID); all bits set to 0 represent the node address (host ID). In a class B network, for example, the subnetwork mask is 255.255.0.0; that is, the first two bytes of the IP address identify the network.
Standard gateway	IP address of the station in the subnetwork that establishes a connection to other networks.
Client	Application that uses the services from another computer. Example: A control system uses a service from the DFE11B option for cyclical data exchange.
Server	Application on a computer that offers services to other computers. Example: The DFE11B option offers a control system the service for cyclical process data exchange.
Broadcast	A broadcast is a transmission to all stations within a distribution list or network.
Patch cable	Network cable for connecting terminals (e.g. MOVIDRIVE® MDX61B with the DFE11B option) to network infrastructure components (e.g. switch). The cables for RX and TX between the terminal and network components (e.g. switch) are connected 1:1.
Cross over cable	Network cable for connecting terminals to one another (e.g. between MOVIDRIVE® MDX61B with the DFE11B option and a PC).
STP	**S**hielded **t**wisted **p**air
UTP	**U**nshielded **t**wisted **p**air

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Address List

Germany			
Headquarters **Production** **Sales**	**Bruchsal**	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal P.O. Box Postfach 3023 · D-76642 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-1970 http://www.sew-eurodrive.de sew@sew-eurodrive.de
Service **Competence Center**	**Central** Gear units / Motors	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 1 D-76676 Graben-Neudorf	Tel. +49 7251 75-1710 Fax +49 7251 75-1711 sc-mitte-gm@sew-eurodrive.de
	Central Electronics	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal	Tel. +49 7251 75-1780 Fax +49 7251 75-1769 sc-mitte-e@sew-eurodrive.de
	North	SEW-EURODRIVE GmbH & Co KG Alte Ricklinger Straße 40-42 D-30823 Garbsen (near Hannover)	Tel. +49 5137 8798-30 Fax +49 5137 8798-55 sc-nord@sew-eurodrive.de
	East	SEW-EURODRIVE GmbH & Co KG Dänkritzer Weg 1 D-08393 Meerane (near Zwickau)	Tel. +49 3764 7606-0 Fax +49 3764 7606-30 sc-ost@sew-eurodrive.de
	South	SEW-EURODRIVE GmbH & Co KG Domagkstraße 5 D-85551 Kirchheim (near München)	Tel. +49 89 909552-10 Fax +49 89 909552-50 sc-sued@sew-eurodrive.de
	West	SEW-EURODRIVE GmbH & Co KG Siemensstraße 1 D-40764 Langenfeld (near Düsseldorf)	Tel. +49 2173 8507-30 Fax +49 2173 8507-55 sc-west@sew-eurodrive.de
	Drive Service Hotline / 24 Hour Service		+49 180 5 SEWHELP +49 180 5 7394357
	Additional addresses for service in Germany provided on request!		

France			
Production **Sales** **Service**	**Haguenau**	SEW-USOCOME 48-54, route de Soufflenheim B. P. 20185 F-67506 Haguenau Cedex	Tel. +33 3 88 73 67 00 Fax +33 3 88 73 66 00 http://www.usocome.com sew@usocome.com
Assembly **Sales** **Service**	**Bordeaux**	SEW-USOCOME Parc d'activités de Magellan 62, avenue de Magellan - B. P. 182 F-33607 Pessac Cedex	Tel. +33 5 57 26 39 00 Fax +33 5 57 26 39 09
	Lyon	SEW-USOCOME Parc d'Affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. +33 4 72 15 37 00 Fax +33 4 72 15 37 15
	Paris	SEW-USOCOME Zone industrielle 2, rue Denis Papin F-77390 Verneuil l'Etang	Tel. +33 1 64 42 40 80 Fax +33 1 64 42 40 88
	Additional addresses for service in France provided on request!		

Algeria			
Sales	**Alger**	Réducom 16, rue des Frères Zaghnoun Bellevue El-Harrach 16200 Alger	Tel. +213 21 8222-84 Fax +213 21 8222-84

Argentina			
Assembly **Sales** **Service**	**Buenos Aires**	SEW EURODRIVE ARGENTINA S.A. Centro Industrial Garin, Lote 35 Ruta Panamericana Km 37,5 1619 Garin	Tel. +54 3327 4572-84 Fax +54 3327 4572-21 sewar@sew-eurodrive.com.ar

Australia			
Assembly **Sales** **Service**	**Melbourne**	SEW-EURODRIVE PTY. LTD. 27 Beverage Drive Tullamarine, Victoria 3043	Tel. +61 3 9933-1000 Fax +61 3 9933-1003 http://www.sew-eurodrive.com.au enquires@sew-eurodrive.com.au
	Sydney	SEW-EURODRIVE PTY. LTD. 9, Sleigh Place, Wetherill Park New South Wales, 2164	Tel. +61 2 9725-9900 Fax +61 2 9725-9905 enquires@sew-eurodrive.com.au

Austria			
Assembly **Sales** **Service**	**Wien**	SEW-EURODRIVE Ges.m.b.H. Richard-Strauss-Strasse 24 A-1230 Wien	Tel. +43 1 617 55 00-0 Fax +43 1 617 55 00-30 http://sew-eurodrive.at sew@sew-eurodrive.at

Belgium			
Assembly **Sales** **Service**	**Brüssel**	CARON-VECTOR S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.caron-vector.be info@caron-vector.be

Brazil			
Production **Sales** **Service**	**Sao Paulo**	SEW-EURODRIVE Brasil Ltda. Avenida Amâncio Gaiolli, 50 Caixa Postal: 201-07111-970 Guarulhos/SP - Cep.: 07251-250	Tel. +55 11 6489-9133 Fax +55 11 6480-3328 http://www.sew.com.br sew@sew.com.br
	Additional addresses for service in Brazil provided on request!		

Bulgaria			
Sales	**Sofia**	BEVER-DRIVE GmbH Bogdanovetz Str.1 BG-1606 Sofia	Tel. +359 2 9532565 Fax +359 2 9549345 bever@fastbg.net

Cameroon			
Sales	**Douala**	Electro-Services Rue Drouot Akwa B.P. 2024 Douala	Tel. +237 4322-99 Fax +237 4277-03

Canada			
Assembly **Sales** **Service**	**Toronto**	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, Ontario L6T3W1	Tel. +1 905 791-1553 Fax +1 905 791-2999 http://www.sew-eurodrive.ca l.reynolds@sew-eurodrive.ca
	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. 7188 Honeyman Street Delta. B.C. V4G 1 E2	Tel. +1 604 946-5535 Fax +1 604 946-2513 b.wake@sew-eurodrive.ca
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger Street LaSalle, Quebec H8N 2V9	Tel. +1 514 367-1124 Fax +1 514 367-3677 a.peluso@sew-eurodrive.ca
	Additional addresses for service in Canada provided on request!		

Chile			
Assembly **Sales** **Service**	**Santiago de Chile**	SEW-EURODRIVE CHILE LTDA. Las Encinas 1295 Parque Industrial Valle Grande LAMPA RCH-Santiago de Chile P.O. Box Casilla 23 Correo Quilicura - Santiago - Chile	Tel. +56 2 75770-00 Fax +56 2 75770-01 ventas@sew-eurodrive.cl

China			
Production **Assembly** **Sales** **Service**	**Tianjin**	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 46, 7th Avenue, TEDA Tianjin 300457	Tel. +86 22 25322612 Fax +86 22 25322611 gm-tianjin@sew-eurodrive.cn http://www.sew.com.cn

China			
Assembly **Sales** **Service**	**Suzhou**	SEW-EURODRIVE (Suzhou) Co., Ltd. 333, Suhong Middle Road Suzhou Industrial Park Jiangsu Province, 215021 P. R. China	Tel. +86 512 62581781 Fax +86 512 62581783 suzhou@sew.com.cn

Colombia			
Assembly **Sales** **Service**	**Bogotá**	SEW-EURODRIVE COLOMBIA LTDA. Calle 22 No. 132-60 Bodega 6, Manzana B Santafé de Bogotá	Tel. +57 1 54750-50 Fax +57 1 54750-44 sewcol@andinet.com

Croatia			
Sales **Service**	**Zagreb**	KOMPEKS d. o. o. PIT Erdödy 4 II HR 10 000 Zagreb	Tel. +385 1 4613-158 Fax +385 1 4613-158 kompeks@net.hr

Czech Republic			
Sales	**Praha**	SEW-EURODRIVE CZ S.R.O. Business Centrum Praha Luná 591 CZ-16000 Praha 6 - Vokovice	Tel. +420 a220121236 Fax +420 220121237 http://www.sew-eurodrive.cz sew@sew-eurodrive.cz

Denmark			
Assembly **Sales** **Service**	**Kopenhagen**	SEW-EURODRIVEA/S Geminivej 28-30, P.O. Box 100 DK-2670 Greve	Tel. +45 43 9585-00 Fax +45 43 9585-09 http://www.sew-eurodrive.dk sew@sew-eurodrive.dk

Estonia			
Sales	**Tallin**	ALAS-KUUL AS Paldiski mnt.125 EE 0006 Tallin	Tel. +372 6593230 Fax +372 6593231 veiko.soots@alas-kuul.ee

Finland			
Assembly **Sales** **Service**	**Lahti**	SEW-EURODRIVE OY Vesimäentie 4 FIN-15860 Hollola 2	Tel. +358 201 589-300 Fax +358 3 780-6211 http://www.sew-eurodrive.fi sew@sew.fi

Gabon			
Sales	**Libreville**	Electro-Services B.P. 1889 Libreville	Tel. +241 7340-11 Fax +241 7340-12

Great Britain			
Assembly **Sales** **Service**	**Normanton**	SEW-EURODRIVE Ltd. Beckbridge Industrial Estate P.O. Box No.1 GB-Normanton, West- Yorkshire WF6 1QR	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk

Greece			
Sales **Service**	**Athen**	Christ. Boznos & Son S.A. 12, Mavromichali Street P.O. Box 80136, GR-18545 Piraeus	Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 http://www.boznos.gr info@boznos.gr

Hong Kong			
Assembly **Sales** **Service**	**Hong Kong**	SEW-EURODRIVE LTD. Unit No. 801-806, 8th Floor Hong Leong Industrial Complex No. 4, Wang Kwong Road Kowloon, Hong Kong	Tel. +852 2 7960477 + 79604654 Fax +852 2 7959129 sew@sewhk.com

Hungary			
Sales **Service**	**Budapest**	SEW-EURODRIVE Kft. H-1037 Budapest Kunigunda u. 18	Tel. +36 1 437 06-58 Fax +36 1 437 06-50 office@sew-eurodrive.hu

India			
Assembly **Sales** **Service**	**Baroda**	SEW-EURODRIVE India Pvt. Ltd. Plot No. 4, Gidc Por Ramangamdi · Baroda - 391 243 Gujarat	Tel. +91 265 2831086 Fax +91 265 2831087 mdoffice@seweurodriveindia.com
Technical Offices	**Bangalore**	SEW-EURODRIVE India Private Limited 308, Prestige Centre Point 7, Edward Road Bangalore	Tel. +91 80 22266565 Fax +91 80 22266569 sewbangalore@sify.com
	Mumbai	SEW-EURODRIVE India Private Limited 312 A, 3rd Floor, Acme Plaza Andheri Kurla Road, Andheri (E) Mumbai	Tel. +91 22 28348440 Fax +91 22 28217858 sewmumbai@vsnl.net

Ireland			
Sales **Service**	**Dublin**	Alperton Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458

Israel			
Sales	**Tel-Aviv**	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 lirazhandasa@barak-online.net

Italy			
Assembly **Sales** **Service**	**Milano**	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano)	Tel. +39 2 96 9801 Fax +39 2 96 799781 sewit@sew-eurodrive.it

Ivory Coast			
Sales	**Abidjan**	SICA Ste industrielle et commerciale pour l'Afrique 165, Bld de Marseille B.P. 2323, Abidjan 08	Tel. +225 2579-44 Fax +225 2584-36

Japan			
Assembly **Sales** **Service**	**Toyoda-cho**	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Toyoda-cho, Iwata gun Shizuoka prefecture, 438-0818	Tel. +81 538 373811 Fax +81 538 373814 sewjapan@sew-eurodrive.co.jp

Korea			
Assembly **Sales** **Service**	**Ansan-City**	SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate Unit 1048-4, Shingil-Dong Ansan 425-120	Tel. +82 31 492-8051 Fax +82 31 492-8056 master@sew-korea.co.kr

Latvia			
Sales	**Riga**	SIA Alas-Kuul Katlakalna 11C LV-1073 Riga	Tel. +371 7139386 Fax +371 7139386 info@alas-kuul.ee

Lebanon			
Sales	**Beirut**	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 4947-86 +961 1 4982-72 +961 3 2745-39 Fax +961 1 4949-71 gacar@beirut.com

Lithuania			
Sales	**Alytus**	UAB Irseva Merkines g. 2A LT-4580 Alytus	Tel. +370 315 79204 Fax +370 315 79688 irmantas.irseva@one.lt

Luxembourg			
Assembly **Sales** **Service**	**Brüssel**	CARON-VECTOR S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.caron-vector.be info@caron-vector.be

Malaysia			
Assembly **Sales** **Service**	**Johore**	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 kchtan@pd.jaring.my

Morocco			
Sales	**Casablanca**	S. R. M. Société de Réalisations Mécaniques 5, rue Emir Abdelkader 05 Casablanca	Tel. +212 2 6186-69 + 6186-70 + 6186-71 Fax +212 2 6215-88 srm@marocnet.net.ma

Netherlands			
Assembly **Sales** **Service**	**Rotterdam**	VECTOR Aandrijftechniek B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 http://www.vector.nu info@vector.nu

New Zealand			
Assembly **Sales** **Service**	**Auckland**	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. +64 9 2745627 Fax +64 9 2740165 sales@sew-eurodrive.co.nz
	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz

Norway			
Assembly **Sales** **Service**	**Moss**	SEW-EURODRIVE A/S Solgaard skog 71 N-1599 Moss	Tel. +47 69 241-020 Fax +47 69 241-040 sew@sew-eurodrive.no

Peru			
Assembly **Sales** **Service**	**Lima**	SEW DEL PERU MOTORES REDUCTORES S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 sewperu@sew-eurodrive.com.pe

Poland			
Assembly **Sales** **Service**	**Lodz**	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 PL-92-518 Lodz	Tel. +48 42 67710-90 Fax +48 42 67710-99 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl

Portugal			
Assembly **Sales** **Service**	**Coimbra**	SEW-EURODRIVE, LDA. Apartado 15 P-3050-901 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt

Romania			
Sales **Service**	**Bucuresti**	Sialco Trading SRL str. Madrid nr.4 011785 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 sialco@sialco.ro

Russia			
Sales	**St. Petersburg**	ZAO SEW-EURODRIVE P.O. Box 263 RUS-195220 St. Petersburg	Tel. +7 812 5357142 +812 5350430 Fax +7 812 5352287 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru

Senegal			
Sales	**Dakar**	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 849 47-70 Fax +221 849 47-71 senemeca@sentoo.sn

Serbia and Montenegro			
Sales	**Beograd**	DIPAR d.o.o. Kajmakcalanska 54 SCG-11000 Beograd	Tel. +381 11 3046677 Fax +381 11 3809380 dipar@yubc.net

Singapore			
Assembly **Sales** **Service**	**Singapore**	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 sewsingapore@sew-eurodrive.com

Slovakia			
Sales	**Sered**	SEW-Eurodrive SK s.r.o. Trnavska 920 SK-926 01 Sered	Tel. +421 31 7891311 Fax +421 31 7891312 sew@sew-eurodrive.sk

Slovenia			
Sales **Service**	**Celje**	Pakman - Pogonska Tehnika d.o.o. UI. XIV. divizije 14 SLO – 3000 Celje	Tel. +386 3 490 83-20 Fax +386 3 490 83-21 pakman@siol.net

South Africa			
Assembly **Sales** **Service**	**Johannesburg**	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 494-3104 dross@sew.co.za
	Capetown	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 dswanepoel@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaceo Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700-3451 Fax +27 31 700-3847 dtait@sew.co.za

Spain			
Assembly **Sales** **Service**	**Bilbao**	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. +34 9 4431 84-70 Fax +34 9 4431 84-71 sew.spain@sew-eurodrive.es

Sweden			
Assembly **Sales** **Service**	**Jönköping**	SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping	Tel. +46 36 3442-00 Fax +46 36 3442-80 http://www.sew-eurodrive.se info@sew-eurodrive.se

Switzerland			
Assembly **Sales** **Service**	**Basel**	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 41717-17 Fax +41 61 41717-00 http://www.imhof-sew.ch info@imhof-sew.ch

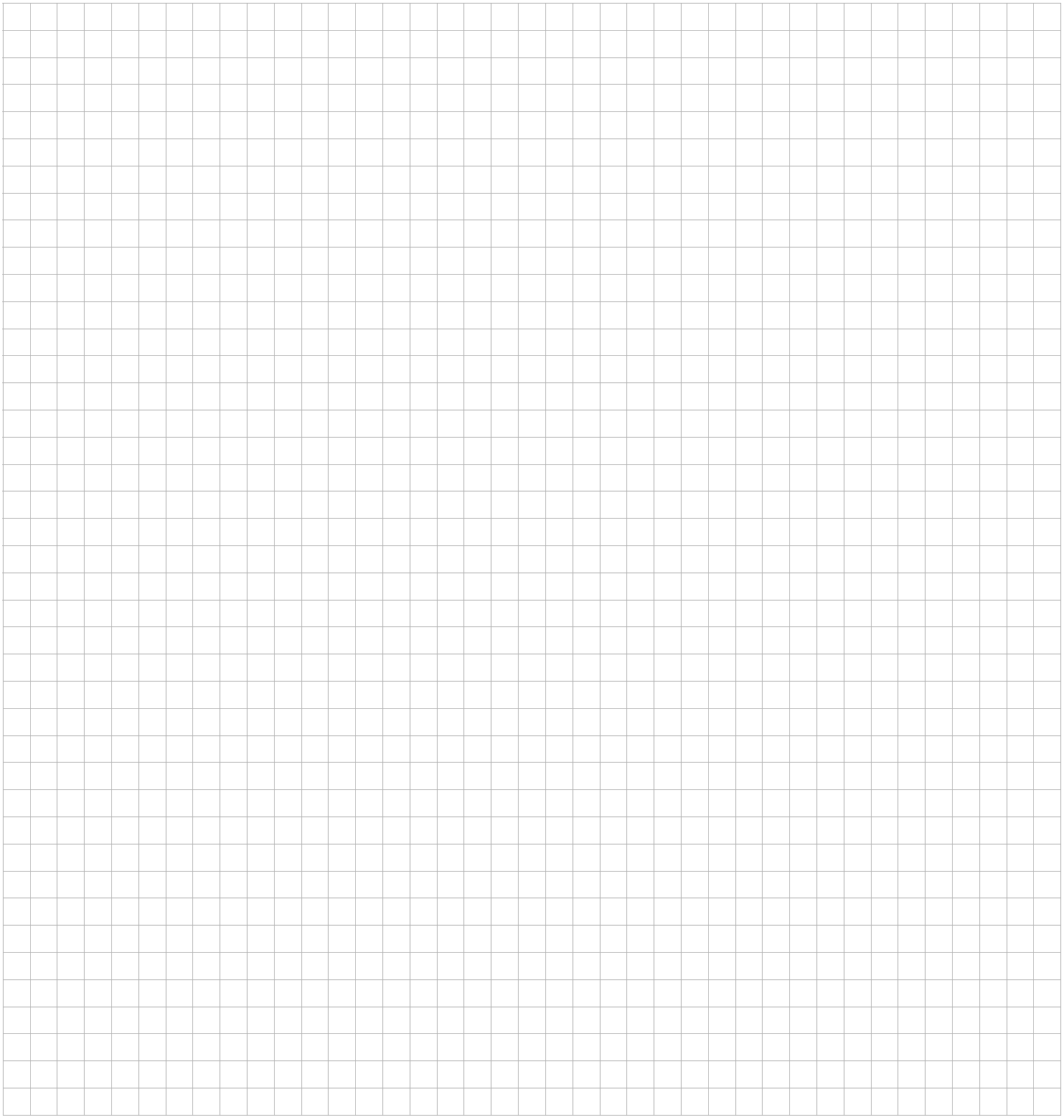
Thailand			
Assembly **Sales** **Service**	**Chon Buri**	SEW-EURODRIVE (Thailand) Ltd. Bangpakong Industrial Park 2 700/456, Moo.7, Tambol Donhuaroh Muang District Chon Buri 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.co.th

Tunisia			
Sales	**Tunis**	T. M.S. Technic Marketing Service 7, rue Ibn El Heithem Z.I. SMMT 2014 Mégrine Erriadh	Tel. +216 1 4340-64 + 1 4320-29 Fax +216 1 4329-76

Turkey			
Assembly **Sales** **Service**	**Istanbul**	SEW-EURODRIVE Hareket Sistemleri Sirketi Bagdat Cad. Koruma Cikmazi No. 3 TR-34846 Maltepe ISTANBUL	Tel. +90 216 4419163 + 216 4419164 + 216 3838014 Fax +90 216 3055867 sew@sew-eurodrive.com.tr

USA			
Production **Assembly** **Sales** **Service**	**Greenville**	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Manuf. +1 864 439-9948 Fax Ass. +1 864 439-0566 Telex 805 550 http://www.seweurodrive.com cslyman@seweurodrive.com
Assembly **Sales** **Service**	**San Francisco**	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, California 94544-7101	Tel. +1 510 487-3560 Fax +1 510 487-6381 cshayward@seweurodrive.com
	Philadelphia/PA	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Dayton	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 440-3799 cstroy@seweurodrive.com
	Dallas	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Additional addresses for service in the USA provided on request!		

Venezuela			
Assembly **Sales** **Service**	**Valencia**	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia, Estado Carabobo	Tel. +58 241 832-9804 Fax +58 241 838-6275 sewventas@cantv.net sewfinanzas@cantv.net



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SEW-EURODRIVE GmbH & Co KG
P.O. Box 3023 · D-76642 Bruchsal / Germany
Phone +49 7251 75-0 · Fax +49 7251 75-1970
sew@sew-eurodrive.com

→ **www.sew-eurodrive.com**